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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/557,629	11/17/2005	Gerard De Haan	NL030529	4454

24737 7590 10/16/2007

PHILIPS INTELLECTUAL PROPERTY & STANDARDS
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EXAMINER	
VANCHY JR, MICHAEL J	

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
10/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/557,629	DE HAAN, GERARD	
	Examiner	Art Unit	
	Michael Vanchy Jr.	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 May 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 May 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/17/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Double Patenting

1. Claims 1, 12, and 17 of this application conflict with claims (1,3), 11, and 16 respectively of Application No. 10/557,966. 37 CFR 1.78(b) provides that when two or more applications filed by the same applicant contain conflicting claims, elimination of such claims from all but one application may be required in the absence of good and sufficient reason for their retention during pendency in more than one application. Applicant is required to either cancel the conflicting claims from all but one application or maintain a clear line of demarcation between the applications. See MPEP § 822.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-3 and 12-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neubauer et al., 2004/0066964 and further in view of Aoyama 5,398,292.

Regarding claim 1, Aoyama teaches a method of estimating an edge orientation in an image, the edge being located in a neighborhood of a particular pixel (100) of the image, the method comprising: creating a set of candidate edge orientations (Fig. 2, 22a-22n); evaluating the candidate edge orientations by means of computing for each of the candidate edge orientations a match error for a corresponding pair of groups (104, 106) of pixels, the match error being based on a difference between pixel values ("pixel intensities") of the two groups (104, 106) of the corresponding pair of groups of pixels (Abstract); and selecting a first one of the candidate edge orientations from the set of candidate edge orientations on basis of the respective match errors and assigning the first one of the candidate edge orientations to the particular pixel (100), characterized in that creating the set of candidate edge orientations is based on previous computations (Abstract).

Aoyama is silent on determining the locations of the two groups (104, 106) of pixels relative to the particular pixel (100) being related to the candidate edge orientation under consideration, however Neubauer et al., does ([0009]). The comparison allows for a more accurate estimation on the nature of the true edge orientation.

Therefore it would be clear to one of ordinary skill in the art at the time of the invention to modify Aoyama to include determining the locations of two groups of pixels for comparison, creating increased accuracy for estimating the true edge orientation.

Regarding claim 12, please see rejection under claim 1. The only difference is that an edge orientation estimation unit is used in claim 12. This unit is analogous to the method in claim 1 and is also described in Neubauer et al. (Fig. 1 and [0023-0026]).

Re claim 12, an edge orientation estimation unit (500) for estimating an edge orientation in an image, the edge being located in a neighborhood of a particular pixel (100) of the image, the edge orientation estimation unit (500) comprising: creating means (502) for creating a set of candidate edge orientations; evaluating means (504) for evaluating the candidate edge orientations by means of computing for each of the candidate edge orientations a match error for a corresponding pair of groups (104, 106) of pixels, the match error being based on a difference between pixel values of the two groups (104, 106) of the corresponding pair of groups (104, 106) of pixels, the locations of the two groups (104, 106) of pixels relative to the particular pixel (100) being related to the candidate edge orientation under consideration; and selecting means (504) for selecting a first one of the candidate edge orientations from the set of candidate edge orientations on basis of the respective match errors and for assigning the first one of the candidate edge orientations to the particular pixel (100), characterized in that the creating means (510) are arranged to create the set of candidate edge orientations on basis of previous computations.

Regarding claim 14, please see rejection under claim 1. The only difference is that an image-processing unit is used, which is a de-interlacing unit comprising interpolation means in claim 14. A circuit for interpolation is used in Aoyama, (Fig. 1, "interpolation circuit"), however, de-interlacing is not mentioned. The examiner takes official notice that it is notoriously well known in the art to use a de-interlacing unit comprising interpolation means and therefore would have been obvious to incorporate. An image-processing unit is analogous to the method in claim 1 and is also described in Neubauer et al. (Fig. 1 and [0023-0026]).

Re claim 14, an image processing apparatus (600) as claimed in claim 13, whereby the image processing unit (604) is a de-interlacing unit comprising interpolation means being controlled by the edge orientation estimation unit (500) for estimating an edge orientation in an image, the edge being located in a neighborhood of a particular pixel (100) of the image, the edge orientation estimation unit (500) comprising: creating

means (502) for creating a set of candidate edge orientations; evaluating means (504) for evaluating the candidate edge orientations by means of computing for each of the candidate edge orientations a match error for a corresponding pair of groups (104, 106) of pixels, the match error being based on a difference between pixel values of the two groups (104, 106) of the corresponding pair of groups (104, 106) of pixels, the locations of the two groups (104, 106) of pixels relative to the particular pixel (100) being related to the candidate edge orientation under consideration; and selecting means (504) for selecting a first one of the candidate edge orientations from the set of candidate edge orientations on basis of the respective match errors and for assigning the first one of the candidate edge orientations to the particular pixel (100), characterized in that the creating means (510) are arranged to create the set of candidate edge orientations on basis of previous computations.

Regarding claim 17, please see rejection under claim 1. The only difference is that a computer program product is used in claim 17. This unit is analogous to the method in claim 1 and is also described in Neubauer et al. (Fig. 1 and [0023-0026]).

Re claim 17, a computer program product to be loaded by a computer arrangement, comprising instructions to estimate an edge orientation in an image, the edge being located in a neighborhood of a particular pixel (100) of the image, the computer arrangement comprising processing means and a memory, the computer program product, after being loaded, providing said processing means with the capability to carry out: creating a set of candidate edge orientations; evaluating the candidate edge orientations by means of computing for each of the candidate edge orientations a match error for a corresponding pair of groups (104, 106) of pixels, the match error being based on a difference between pixel values of the two groups (104, 106) of the corresponding pair of groups (104, 106) of pixels, the locations of the two groups (104, 106) of pixels relative to the particular pixel (100) being related to the candidate edge orientation under consideration; and selecting a first one of the candidate edge orientations from the set of candidate edge orientations on basis of the

respective match errors and assigning the first one of the candidate edge orientations to the particular pixel (100), characterized in that creating the set of candidate edge orientations is based on previous computations.

Regarding claim 2 Neubauer et al., teaches: a method as claimed in claim 1, characterized in that the set of candidate edge orientations is created by selecting the candidate edge orientations from a further set of edge orientations, the further set of edge orientations comprising further edge orientations (230-254) which have been assigned to other pixels of the image after previous edge orientation estimations ([0027]).

Regarding claim 3 Neubauer et al., teaches: a method as claimed in claim 2, characterized in that selecting a second (240) one of the candidate edge orientations from the further set of edge orientations (230-254) is based on: the second (240) one of the candidate edge orientations; and on the position of a first (262) one of the other pixels to which the second (240) one of the candidate edge orientations has been assigned, relative to the particular pixel (100) ([0027]).

Regarding claim 13 Neubauer et al., teaches: an image processing apparatus (600) comprising: receiving means (602) for receiving a signal corresponding to a sequence of input images; and an image processing unit (604) for computing a sequence of output images on basis of the sequence of input images, the image processing unit being controlled by the edge orientation estimation unit (500) as claimed in claim 12 (Fig. 1 and [0024]).

Regarding claim 15 Neubauer et al., teaches: an image processing apparatus (600) as claimed in claim 13, characterized in further comprising a display device (606) for displaying the output images (Fig. 1 and [0024]).

Regarding claim 16 Neubauer et al., teaches: an image processing apparatus (600) as claimed in claim 15, characterized in that it is a TV (Fig. 1 and [0024]).

Even though Neubauer et al., is silent on the display device being a television, it is obvious to one of ordinary skill in the art at the time of the invention that the display can be a television, since it works for a display using a CPU.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Neubauer et al., 2004/0066964, Aoyama 5,398,292 as applied to claim 1 above, and further in view of Oguz et al., 7,054,367 B2.

Neubauer et al. and Aoyama are silent on using an image and a further image both belonging to a single sequence of video images, however, Oguz et al. does. Using a previous image in a single sequence of video images improves upon the accuracy and speed in which the edge orientation can be determined. This is because there is already information that has been calculated available to process the further image.

Re claim 4, a method as claimed in claim 1, characterized in that the set of candidate edge orientations is created by selecting the candidate edge orientations from a further set of edge orientations, the further set of edge orientations comprising further edge orientations which have been assigned to a further pixel of a further image, after a previous edge orientation estimation, the image and the further image both belonging to a single sequence of video images (7,054,367 B2, Fig. 1).

Therefore taking the combined teachings of Neubauer et al., Aoyama, and Oguz et al., as a whole it would be clear to one of ordinary skill in the art at the time of the invention to use an image and further image from a single sequence of video images for increased accuracy and efficiency.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Neubauer et al., 2004/0066964, Aoyama 5,398,292 as applied to claim 1 above, and further in view of Silver et al., 6,408,109 B1.

Neubauer et al. and Aoyama are silent on using a predetermined threshold, however, Silver et al. does. Using a threshold increases accuracy and efficiency by eliminating edge orientations that are either below or above a certain value. This also increases the efficiency of eliminating false edges created by noise.

Re claim 5, a method as claimed in claim 1, characterized in that creating the set of candidate edge orientations comprises: computing an initial estimate of the edge orientation; creating the candidate edge orientations on basis of the initial estimate of the edge orientation and a predetermined threshold (col.13, lines 45-53).

Therefore taking the combined teachings of Neubauer et al., Aoyama, and Silver et al., as a whole it would be clear to one of ordinary skill in the art at the time of the invention to use a threshold for increased accuracy and efficiency.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Neubauer et al., 2004/0066964, Aoyama 5,398,292, Silver et al., 6,408,109 B1, and further in view of Guo, 6,636,633 B2.

Neubauer et al., Aoyama, and Silver et al. are silent on using blocks of pixels and taking the sum of differences between these blocks of pixels, however Guo does. Using blocks of pixels decreases the sets of edge orientations, allowing for increases speed of determining the true edge orientation. The sum of differences increases the accuracy of selecting the true edge orientation.

Re claim 6, a method as claimed in claim 5, characterized in that computation of the initial estimate of the edge orientation comprises: computing a first sum of

differences between pixel values of two blocks (302-304) of pixels which have opposite horizontal offsets relative to the particular pixel (100); computing a second sum of differences between pixel values of two blocks (306-308) of pixels which have opposite vertical offsets relative to the particular pixel (100); and determining the initial estimate of the edge orientation by means of computing a quotient of the first sum of differences and the second sum of differences (Abstract and col. 4, lines 37-57).

Guo takes the sum of differences for each of the different directions on opposing sides of the boundary, which can include the vertical and horizontal side. An offset can easily be taken and is well known in the art. Even though Guo is silent on computing a quotient between the first and second sum of differences, it would be obvious to one with ordinary skill in the art to use the sum of differences Guo calculates to get a quotient.

Therefore taking the combined teachings of Neubauer et al., Aoyama, Silver et al., and Guo as a whole it would be clear to one of ordinary skill in the art at the time of the invention to use blocks of pixels and calculating the sum of differences for increased accuracy and efficiency.

7. Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neubauer et al., 2004/0066964, Aoyama 5,398,292 as applied to claim 1 above, and further in view of Guo, 6,636,633 B2.

Neubauer et al. and Aoyama are silent on using blocks of pixels and taking the sum of differences between these blocks of pixels, however Guo does. Using blocks of pixels decreases the sets of edge orientations, allowing for increases speed of determining the true edge orientation. The sum of differences increases the accuracy of selecting the true edge orientation.

Regarding claim 7 Guo teaches: a method as claimed in claim 1, characterized in that the first one of the candidate edge orientations is assigned to a block (102) of pixels comprising the particular pixel (100) (Abstract).

Regarding claim 8 Guo teaches: a method as claimed in claim 7, characterized in that other edge orientations are assigned to other blocks of pixels of the image on basis of other edge orientation estimations for the other blocks of pixels and that final edge orientations are computed for sub-blocks of pixels of the image by means of block erosion (Figs. 2A-2D).

Regarding claim 9 Guo teaches: a method as claimed in claim 1, characterized in that the match error is based on the sum of absolute differences between respective pixels of the two groups (104, 106) of pixels (Abstract and col. 4, lines 37-61).

Regarding claim 10 Guo teaches: a method as claimed in claim 1, characterized in that the groups (104, 106) of pixels are respective rectangular blocks of pixels (Figs. 2A-2D).

Therefore taking the combined teachings of Neubauer et al., Aoyama, Silver et al., and Guo as a whole it would be clear to one of ordinary skill in the art at the time of the invention to use blocks of pixels and calculating the sum of differences for increased accuracy and efficiency.

Claim 11 is rejected. The examiner takes official notice that it is notoriously well known in the art to use variant shaped blocks of pixels including a trapezoidal shape and therefore would have been obvious to incorporate.

Re claim 11, a method as claimed in claim 1, characterized in that the groups (402-412) of pixels are respective trapezium shaped blocks of pixels of which the actual shapes depend on the candidate edge orientation under consideration.

Examiner's Note

The referenced citations made in the rejection(s) above are intended to exemplify areas in the prior art document(s) in which the examiner believed are the most relevant to the claimed subject matter. However, it is incumbent upon the applicant to analyze the prior art document(s) in its/their entirety since other areas of the document(s) may be relied upon at a later time to substantiate examiner's rationale of record. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). However, "the prior art's mere disclosure of more than one alternative does not constitute a teaching away from any of these alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed...." In re Fulton, 391 F.3d 1195, 1201, 73 USPQ2d 1141, 1146 (Fed. Cir. 2004).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Vanchy Jr. whose telephone number is (571) 270-1193. The examiner can normally be reached on Monday - Friday 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed can be reached on (571) 272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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